NEW JERSEY DEPARTMENT of HEALTH and SENIOR SERVICES

Public Health Assessment

Quanta Resources Corporation Edgewater, Bergen County

CERCLIS # NJD000606442

Public Comment Release

Public Comment Period: July 10 - August 10, 2002

Prepared Under a Cooperative Agreement with the:

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

All comments must be submitted in writing to:

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THE ATSDR HEALTH ASSESSMENT: A NOTE OF EXPLANATION

Section 104 (i) (6) (F) of the Comprehensive Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, states "...the term 'health assessment' shall include preliminary assessments of potential risks to human health posed by individual sites and facilities, based on such factors as the nature and extent of contamination, the existence of potential pathways of human exposure (including ground or surface water contamination, air emissions, and food chain contamination), the size and potential susceptibility of the community within the likely pathways of exposure, the comparison of expected human exposure levels to the short-term and long-term health effects associated with identified hazardous substances and any available recommended exposure or tolerance limits for such hazardous substances, and the comparison of existing morbidity and mortality data on diseases that may be associated with the observed levels of exposure. The Administrator of ATSDR shall use appropriate data, risk assessments, risk evaluations, and studies available from the Administrator of EPA."

In accordance with the CERCLA section cited, this Health Assessment has been conducted using available data. Additional Health Assessments may be conducted for this site as more information becomes available.

The conclusions and recommendations presented in this Health Assessment are the result of site specific analyses and are not to be cited or quoted for other evaluations or Health Assessments.

Public Comment Draft

Public Health Assessment

Quanta Resources Corporation
Edgewater, Bergen County, New Jersey
CERCLIS ID No. NJD000606442

Public Comment Draft

Prepared By:

Hazardous Site Health Evaluation Program
Consumer and Environmental Health Services
Division of Epidemiology, Environmental and Occupational Health
New Jersey Department of Health and Senior Services

Under Cooperative Agreement with:
The Agency for Toxic Substances and Disease Registry

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Abbreviations

AST	above ground storage tank
ATSDR	Agency for Toxic Substances and Disease Registry
BTEX	benzene, toluene, ethylbenzene, xylene
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act (commonly known as Superfund)
CREG	Cancer Risk Evaluation Guides
FAQs	Frequently Asked Questions
GIS	Geographic Information System
HAZWOPER	Hazardous Waste Operations and Emergency Response Standard
HCV	Health Comparison Value
MUA	Municipal Utilities Authority
ND	none detected
NJDEP	New Jersey Department of Environmental Protection
NJDHSS	New Jersey Department of Health and Senior Services
NPL	National Priorities List
PAHs	polycyclic aromatic hydrocarbons
PCBs	polychlorinated biphenyls
PHAP	Public Health Action Plan
PPB	parts per billion
PPM	parts per million
PRP	Potentially Responsible Party
QRC	Quanta Resources Corporation
RSI	removal site investigation
SVOCs	semi-volatile organic compounds
USEPA	United States Environmental Protection Agency
UST	underground storage tank
VOCs	volatile organic compounds

Summary

The Quanta Resources Corporation site is located at 163 River Road, Edgewater, Bergen County, New Jersey. The site covers approximately 16 acres and is located in a mixed industrial, commercial, and residential zoned area. From 1896 through 1974, the site was the location of a coal tar distillation plant. Beginning in 1974, recycling of waste oil occurred at the site. Quanta Resources Corporation leased the site on July 15, 1980 and conducted storage, reprocessing, reclamation, and recovery of waste oil. As a result of site operation activities, poor housekeeping, improper disposal practices, recurring spills, discharges, flooding, and rainwater overflows at the site, on-site soils, sediment, and groundwater were contaminated with tar materials and oils containing hazardous substances which included polycyclic aromatic hydrocarbons, volatile and semi-volatile aromatic compounds, and metals. The Quanta Resources Corporation filed for bankruptcy on October 6, 1981. Under the Comprehensive Environmental Response, Compensation and Liability Act of 1980, the United States Environmental Protection Agency assumed the lead responsibility for the control of the site; the site was proposed to be added to the National Priorities List of Superfund sites on January 11, 2001.

The area surrounding the Quanta Resources Corporation site is currently undergoing extensive commercial and residential redevelopment. These surrounding construction projects, as well as the Quanta Resources Corporation site itself, have led to community concerns about the safety of the air, soil, and sediment at nearby homes and workplaces.

The New Jersey Department of Health and Senior Services, in conjunction with the Agency for Toxic Substances and Disease Registry, have not identified completed human exposure pathways associated with the Quanta Resources Corporation site. However, on-site soil and sediment contamination is present at levels of potential public health concern. Based on limited data available for review and analysis, there are no discernible completed human exposure pathways currently at the Quanta Resources Corporation site. It is conceivable that this may change with any future remediation and/or construction activities at the site or the implementation of a more comprehensive environmental monitoring program. If this occurs, a route of exposure to contamination may be established resulting in completed human exposure pathways.

Therefore, the New Jersey Department of Health and Senior Services and the Agency for Toxic Substances and Disease Registry consider the Quanta Resources Corporation site an ***"Indeterminate Public Health Hazard."*** As site conditions change with any future remediation and/or construction activities at the Quanta Resources Corporation site, public health implications and the potential for completed human exposure pathways will be reevaluated. Furthermore, additional investigation of neighboring properties is advisable. If additional data become available to indicate that there are completed human exposure pathways attributable to the Quanta Resources Corporation site, the current designated Hazard Category for the site will be reconsidered.

Purpose and Health Issues

On January 11, 2001, the United States Environmental Protection Agency proposed to add the Quanta Resources Corporation site, Edgewater, Bergen County, New Jersey, to the National Priorities List (NPL) of Superfund sites. Subsequent to the publication of an April 18, 2001 Health Consultation for the site, the New Jersey Department of Health and Senior Services, in cooperation with the Agency for Toxic Substances and Disease Registry, prepared the following Public Health Assessment to review environmental data obtained from the site, define potential human exposure to contaminants, and to determine whether the exposures are of public health concern.

Background

Demography and Land Use

The Quanta Resources Corporation (QRC) site is located at 163 River Road, Edgewater, Bergen County, New Jersey (see inset and Figure 1). The QRC site covers approximately 16 acres and is located in a mixed industrial, commercial, and residential zoned area, much of which is in the process of being redeveloped. The site is bordered to the north by the former Celotex Industrial Park, to the east by the Hudson River (roughly opposite West 93rd Street, Manhattan), to the south by the former Spencer Kellogg property, and to the west by "old" River Road (a local commercial thoroughfare). "New" River Road is located east of its former location and cuts across the western portion of the QRC site. Residential housing overlooks the site from atop the New Jersey Palisades cliffs which are located west of the site at a distance of approximately 500 yards. Geographic Information System (GIS) spatial analysis technology, in conjunction with 1990 United States Census data, were used by the Agency for Toxic Substances and Disease Registry (ATSDR) to estimate that there are approximately 33,000 individuals residing within a one mile radius of the QRC site (see Figure 2).

Quanta Resources Corporation
N 40^{O} 48' 25"; W 73^{O} 59' 31"

Geologically, the QRC site is located within the Newark Basin of the Piedmont Physiographic Providence of New Jersey. The site has a surficial layer of fill ranging from approximately 11 to over 25 feet in thickness (Melick-Tully and Associates 2000) containing fine to medium grained sand, silt, cinders, brick, wood, gravel gypsum, cobbles, boulders, and concrete debris. The fill is underlaid by estuarine and saltmarsh deposits (primarily silty/sandy material and organic clayey silts as discontinuous layers or lenses) overlying bedrock. The clay consists of gray to black semiplastic-like soil with areas containing traces of silt, roots, and shell fragments.

According to 1990 United States Census data, there are no reported private drinking water wells located in Edgewater. The primary sources of potable water for portions of Bergen (including Edgewater) and Hudson counties are the Oradell and Woodcliff Lake reservoirs in Bergen County, New Jersey, and Lake Tappan and Lake DeForest reservoirs in Rockland County, New York (United Water New Jersey 1999). Groundwater flow is from west to east discharging to the Hudson River. The Hudson River and groundwater at the site are tidally influenced.

Site History

From 1896 through 1974, the current QRC site, as well as the southern portion of the former Celotex Industrial Park property, was the location of a coal tar distillation plant (NJDEP 2000) as well as various other manufacturing operations (R. Hayton, NJDEP, personal communication, 2002). Beginning in 1974, recycling of waste oil occurred at the site. QRC leased the site on July 15, 1980 and conducted storage, reprocessing, reclamation, and recovery of waste oil. The QRC site had 61 above ground storage tanks (ASTs) with a total capacity of approximately nine million gallons, about 10 underground storage tanks (USTs) with an estimated capacity of 40,000 gallons, and numerous underground transfer lines and pipes. The ASTs were used to store coal tar, oil, tar, asphalt, sludge, process water, and other liquids. Many of the ASTs had wooden roofs which were partially or totally collapsed, which allowed rain water to enter and overflow. About 50 drums containing oils, sludges, contaminated absorbent materials, debris, and uncharacterized materials were staged on the site.

On July 2, 1981, the New Jersey Department of Environmental Protection (NJDEP) stopped all oil recycling activities at the QRC site when it was discovered that the storage tanks contained nearly 266,000 gallons of waste oil contaminated with polychlorinated biphenyls (PCBs) in excess of 50 parts per million (ppm), the limit set forth by the federal Toxic Substances Control Act (NJDEP 1983). PCBs were detected at levels as high as 265 ppm. Inspections at waste oil recycling facilities have been conducted to determine if hazardous wastes were deliberately being mixed with waste oils to avoid regulations set forth by the federal Resource Conservation and Recovery Act and to determine the use of the resulting blend (USEPA 1983). Principal operating personnel for QRC were charged with hazardous waste violations in several states resulting in two convictions. The QRC filed for bankruptcy on October 6, 1981.

Subsequent to the bankruptcy action, upkeep of the QRC site essentially ceased. Freezing and thawing caused by temperature extremes, as well as rusty valves and seams, resulted in AST leaks and spills. Underground transfer lines were not tested for integrity or destination and provided a spill pathway to the Hudson River. Large areas of the site were frequently flooded for extended periods of time by the tidally influenced Hudson River (USEPA 1984). A containment boom installed along the Hudson River failed to keep oil from entering the river with out-going tides since accumulated oil was not collected and properly disposed (USEPA 1984). No containment structures to control spills or runoff were reported to be present on the site. Temporary emergency clay diking was eventually constructed around the perimeter of the site.

As a result of site operation activities, poor housekeeping, improper disposal practices, recurring spills, discharges, flooding, and rainwater overflows at the QRC site, on-site soils were contaminated with tar materials and oils containing hazardous substances which included polycyclic aromatic hydrocarbons (PAHs), volatile and semi-volatile aromatic compounds, and metals. When a November 1983 NJDEP Administrative Consent Order failed to force QRC responsible parties to perform major cleanup and stabilization of the site, and no steps were taken to eliminate the existing threat to the public health and environment, the NJDEP requested that the United States Environmental Protection Agency (USEPA) help to address the PCBs and other hazardous substances through the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA). Subsequent to the USEPA issuance of an Administrative Consent Order in April 1985 which named 88 potentially responsible parties (PRPs) including owners, operators, generators, and transporters in an effort to "prevent immediate and significant risk of harm to human health and the environment" (USEPA 1985a), an Administrative Order on Consent was signed with the site's property owners (USEPA 1985b).

Under USEPA supervision, removal action activities were conducted at the QRC site from 1984 through 1988. These activities primarily involved the cleaning and removal of the ASTs and USTs. Approximately 1.35 million gallons of PCB-contaminated oil were removed, and over 1.5 million gallons of coal tar were removed from storage tanks and recycled. Underground pipes and shallow soils containing coal tar residues and oil were also removed from the site. Figure 3 provides a representation of on-site conditions in 1999, subsequent to removal action activities.

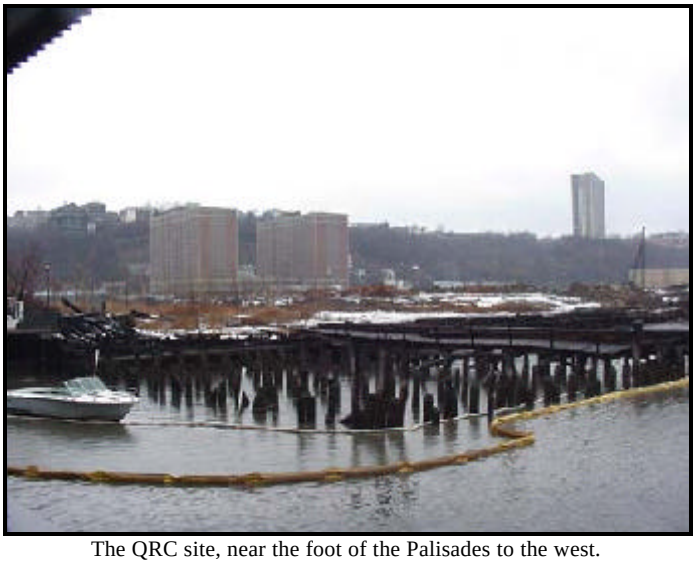
Beginning in 1992, the USEPA assessed the removal activities performed by a PRP by collecting soil, ground and surface water, and sediment samples from the site. Analytical results indicated elevated concentrations of PAHs and metals. Pursuant to a USEPA Administrative Consent Order, AlliedSignal, a PRP, contracted with GeoSyntec Consultants, Atlanta, Georgia to conduct a Removal Site Investigation (RSI). The RSI was conducted in 1998 through 1999, and included the collection of surface and sub-surface soil samples from the QRC site and neighboring properties, sediment samples from the Hudson River, and groundwater monitoring.

Past ATSDR Involvement

In the fall of 1998, the USEPA requested that the ATSDR review soil sampling data obtained at the former Celotex Industrial Park site, located on the northern boundary of the QRC site, to determine if a health threat existed to workers performing sub-surface activities at the Celotex Industrial Park site. The ATSDR advised that work be conducted by individuals trained in hazardous materials operations, following all requirements of the Occupational Safety and Health Administration's (OSHA) Hazardous Waste Operations and Emergency Response (HAZWOPER) Standard, 29 CFR 1910.120 (T. Mignone 1998).

Site Visit

On January 19, 2001 representatives of the New Jersey Department of Health and Senior Services (NJDHSS), ATSDR, NJDEP, and USEPA conducted a site visit of the QRC site. NJDHSS representatives were James Pasqualo, Julie Petix, Sharon Kubiak, Narendra P. Singh, and Steven Miller; Thomas Mignone represented the ATSDR. Weather conditions at the time of the inspection were freezing rain with temperatures in the lower 30s. Winds were from the northeast at approximately 15 mph, and the ground was covered with snow and ice.



The QRC site, near the foot of the Palisades to the west.

The area surrounding the QRC site is currently being redeveloped for residential and commercial use. The QRC site is surrounded by a chain link perimeter fence, although a gate was observed to be open, and a hole in the fence allowed for site access. No construction activity at the QRC site was observed on the day of the site visit. Physical hazards were present at the site which included sharp metal objects, holes, and debris. Additionally, areas of the site near the river's edge were physically unstable. Strong petroleum and sulfurous odors were noted. Evidence of individuals walking their dogs was present particularly on the southern portion of the site.

North of the QRC site is the former Celotex Industrial Park property. A three-story development, referred to as "The Promenade," has been constructed on this property. It contains 162 units of luxury condominiums and apartments located on an 800 foot pier extending over the Hudson River. An inactive landfill (containing primarily gypsum wallboard debris), located on the former Celotex Industrial Park property between the QRC site and The Promenade pier, is now covered by paving bricks which allows for vehicular access. Multiplex Cinemas is located on the former

Lustrelon property north of the QRC site beyond the former Celotex Industrial Park property. Bordering the QRC site to the east is the Hudson River. The Hudson River is a major commercial waterway serving ports in both New Jersey and New York. It also has been cited as a significant striped bass habitat and is fished. Located to the south of the site is the former Spencer Kellogg property. A large brick building on this property has been renovated and is currently being used for office suites and a parking garage. Palisades Child Care Center (115 River Road) is one of the businesses located in this building. The child care center provides day care for children six weeks of age through kindergarten. Licensed for 112 children (five classrooms), the center provides services for 70 to 80 children daily. There is an outside play area available for use by the children. Part of the base of this outdoor play area is covered with asphalt while the remainder is covered with four to six inches of shredded rubber tires (R. Ho, USEPA, personal communication, 2002). Managerial staff of the child care center have been advised to keep children indoors on days when area odors are strong (R. Montgomery, USEPA, personal communication, 2001). Located west of the site are the Waterford Towers (190 River Road), a 378 unit, two building rental community for active senior citizens. Waterford Towers began occupancy in April 2001. Located northwest of the site (beyond the former Celotex Industrial Park property) is Sunrise Assisted Living, located at 351 River Road, a 70-unit assisted living facility which opened in October 2000.

PAH sheen on the Hudson River adjacent to the QRC site.

The region of the Hudson River adjacent to the QRC site is tidally influenced and at the time of the site visit (low tide), patches of PAH sheens could be observed along the mud flats. The grade of the site is approximately nine feet above the low water mark of the river. According to the NJDEP, a public access river walk along the banks of the Hudson River may be planned as part of future area redevelopment activities.

A second site visit of the QRC site was conducted on May 15, 2001. Present were Sharon Kubiak, Narendra P. Singh, Steven Miller, and Julie Petix. The purpose of the visit was twofold: 1) to determine whether odors which were evident during the January 2001 site visit were stronger in warmer ambient temperatures commensurate with the seasonal change; and 2) to observe whether there were additional outdoor activities occurring among area residents and visitors. The site visit commenced at approximately 11 am. Weather conditions at the time of the site visit were sunny, clear, blue sky, breezy (variable winds), with temperatures in the mid 60's. Odors were evident,

described by those present as "foul river," "sewage, decaying smell," and "asphalt, tar smell." About 15 - 20 children were observed playing outside of the Palisades Child Care Center (southern exit). Plastic playground equipment was available for the children's use in the play area. Edgewater Pediatrics was also noted as one of many other businesses operating in the building complex.

No activity was occurring at the QRC site although footprints in the sand along the shoreline of the site were noted. At the former Celotex Industrial Park site, construction activity was ongoing. Two cranes, an excavator, bulldozers, and drills were among the heavy equipment in use. Construction workers and surveyors were present. All wore hard hats; some wore Tyvek suits, booties, and hearing protection. No respirators were observed in use among any of these individuals. Several cars drove in and out of The Promenade parking area, and there was no pedestrian traffic observed at the time of the site visit.

On July 26, 2001, staff of the NJDHSS met with two Edgewater Borough public health nurses. The NJDHSS discussed and provided a variety of health information on contaminants detected at the QRC site and neighboring properties. The nurses described reports of human exposures to area surface water and river sediment, which included an incident involving individuals wading in the Hudson River to observe a holiday fireworks display.

Community Concerns

The USEPA reported to the NJDHSS that some Edgewater Municipal Utilities Authority (MUA) workers were concerned about long term exposures to area contaminants entering the sewer system. Alleged exposures to these workers occur when they perform sewer maintenance activities. The Edgewater MUA is actively addressing worker concerns regarding potential contamination of the sewer system and alleged worker exposures to contaminants. Additionally, Edgewater Borough is developing and implementing health and safety programs for borough emergency response employees who may respond to potential emergency events that arise during area redevelopment activities.

During the month of May 2001, several unions representing heavy construction workers contacted the NJDEP to voice their concern over an insufficient and unimplemented worker health and safety plan at the former Celotex Industrial Park. A number of worker health complaints were described, including rashes around the mouth and ears, headaches, nausea, and legs burning after being splashed with on-site water. Elevated levels of hydrogen sulfide in air were also detected at the property (R. Hayton, NJDEP, personal communication, 2001). On May 17, OSHA inspected the property and issued an informal order to "Cease and Desist." During the work shutdown, the on-site workers were provided with requisite HAZWOPER training, appropriate personal protective equipment, and a proper health and safety plan. Additionally, the NJDEP was provided with both soil management and perimeter sampling plans for the site as was requested. Work activities recommenced during the last week of June 2001.

Increasing news media coverage has piqued public concern and interest about the QRC site and neighboring properties (Dwyer 2001). On August 16, 2001, staff of the NJDHSS attended a USEPA meeting with residents of The Promenade and other interested parties. Representatives of the NJDEP were also present. The NJDHSS discussed and responded to questions regarding health concerns from potential exposures to area contaminants. Individuals were particularly concerned about health effects from potential arsenic exposures.

Discussion

The general method for determining whether a public health hazard exists to a community is to determine first whether there is a completed exposure pathway from a contaminant source to a receptor population. It is then determined whether levels of contamination are high enough to be of public health concern. This is done by making comparisons to established health comparison values to screen for contaminants which may be at levels of potential health concern. Environmental data available for the QRC site were obtained and reviewed for this purpose.

A compilation of environmental sample results for the QRC site and neighboring properties dating from March 1992 through June 1999 were provided in a Removal Site Investigation report (GeoSyntec Consultants 1999). Media evaluated included soil, river sediment, and groundwater. These data were organized by the NJDHSS as on-site (QRC) versus off-site (neighboring properties), categorized as surface versus sub-surface (soil and sediment sample data), and analyzed. There were no outdoor air monitoring data in this report. In a separate report, limited indoor air samples and one outdoor soil sample were collected at the Palisades Child Care Center (Lockheed Martin/USEPA/ERTC 2001).

On-Site Contamination

On-site contamination is defined as those data limited to the QRC site property boundary.

Soil

On-site data were categorized as surface soil samples (0 - 0.5 foot depth) and sub-surface soil samples (> 0.5 foot depth). Two samples collected at 0 - 1 foot depth were included among the surface soil samples. The deepest soil sample collected was at 31 - 32 feet below ground surface. Ranges of results (minimum versus maximum concentration of contaminants detected) are summarized in Tables 1 and 2. Results do not include concentrations for which depth of sampling was not indicated (i.e., test pits). ATSDR Health Comparison Values and NJDEP Soil Clean-up Criteria (N.J.A.C. 7:26D) are provided for comparison purposes. NJDEP Soil Clean-up Criteria are based on human health impacts but also take into consideration environmental impacts. Maximum surface soil concentrations included: 17 ppm of arsenic; 4.8 ppm of chromium; 4,540 ppm of lead; 14,700 ppm of PAHs; and 74 ppm of PCBs (Table 1). Maximum sub-surface soil concentrations included:

67.2 ppm of arsenic; 35 ppm of chromium; 553 ppm of lead; 31,600 ppm of PAHs; 0.14 ppm of PCBs; and 187 ppm of VOCs (Table 2).

VOCs consist of a variety of compounds which were not specified in the sampling data provided in the 1999 Removal Site Investigation Report. Benzene, toluene, ethylbenzene, and xylene (BTEX) are the primary VOCs reported in soil.

Sediment

Data from Hudson River sediment within the QRC site border (the QRC site property deed extends about 700 feet off the bulkhead into the Hudson River, R. Hayton, NJDEP, personal communication, 2001) were categorized as surface sediment samples (0 - 1 foot depth) and sub-surface sediment samples (> 1 foot depth). The deepest sediment sample was collected at 25 - 26 feet below surface. Ranges of results (minimum versus maximum concentration of contaminants detected) are summarized in Tables 3 and 4. Results do not include concentrations for which depth of sampling was not indicated. NJDEP Guidance for Sediment Quality Evaluations for both fresh and saltwater (November 1998) are provided for comparison purposes although they are based upon ecological rather than human health risk. The maximum concentrations of contaminants detected in surface sediment included: 19.1 ppm of arsenic; 83.7 ppm of chromium; 130 ppm of lead; 728 ppm of PAHs; and 0.91 ppm of PCBs. Maximum sub-surface sediment concentrations included: 100 ppm of arsenic; 270 ppm of chromium; 362 ppm of lead; 12,600 ppm of PAHs; 2.5 ppm of PCBs; and 0.82 ppm of VOCs.

Off-Site Contamination

Pursuant to the 1999 RSI, environmental samples were collected from the QRC site as well as neighboring properties. These properties included the former Celotex Industrial Park property, the former Lustrelon property, the former Spencer Kellogg property, and the former Lever Brothers property. The Celotex Industrial Park contained portions of the coal tar distillation plant that existed on the QRC site, a chemical plant, then later a gypsum wall board manufacturer. The former Lustrelon property (located north of the former Celotex Industrial Park property) housed a lacquer spray paint/parts cleaning operation and raw materials warehouse. Spencer Kellogg was a linseed oil manufacturer. The former Lever Brothers property (located south of the former Spencer Kellogg property) is now occupied by Unilever Research US and their laboratories, administrative offices, and pilot plants. Limited air and soil sample results from the Palisades Child Care Center are also presented.

Soil

Off-site data were categorized as surface soil samples (0 - 0.5 foot depth) and sub-surface soil samples (> 0.5 foot depth). The deepest soil sample collected was at 24 - 25 feet below ground

surface. Ranges of results (minimum versus maximum concentration of contaminants detected) are summarized in Tables 5 and 6. Results do not include concentrations for which depth of sampling was not indicated. Maximum surface soil concentrations included: 27.5 ppm of arsenic; 80.4 ppm of chromium; 408 ppm of lead; 1,150 ppm of PAHs; and 14.6 ppm of PCBs (Table 5). Maximum sub-surface soil concentrations included: 3,370 ppm of arsenic; 676 ppm of chromium; 10,800 ppm of lead; 23,400 ppm of PAHs; 6,810 ppm of PCBs; and 392 ppm of VOCs (Table 6). Sub-surface soil concentrations of 65,700 ppm of arsenic and 46,000 ppm of lead have been detected at the former Celotex Industrial Park site (Environmental Waste Management Associates 2000).

Sediment

Data from Hudson River sediment adjacent to the borders of the neighboring properties to the north and south of the QRC site were categorized as surface sediment samples (0 - 1 foot depth) and sub-surface sediment samples (> 1 foot depth). The deepest sediment sample was collected at 20 - 20.8 feet below surface. Ranges of results (minimum versus maximum concentration of contaminants detected) are summarized in Tables 7 and 8. The maximum concentrations of contaminants detected in surface sediment included: 2,150 ppm of arsenic; 160 ppm of chromium; 1,540 ppm of lead; 1,140 ppm of PAHs; and 3.5 ppm of PCBs (Table 7). Maximum sub-surface sediment concentrations included: 1,860 ppm of arsenic; 270 ppm of chromium; 780 ppm of lead; 21,500 ppm of PAHs; 6.5 ppm of PCBs; and 28.2 ppm of VOCs (Table 8).

Indoor Air and Soil: Palisades Child Care Center

In an effort to assess the potential for exposure to hazardous substances associated with the QRC site among children attending the Palisades Child Care Center, the USEPA performed limited air monitoring and soil sampling. Indoor air samples were collected from the Palisades Child Care Center and analyzed for volatile organic compounds (VOCs) and PAHs; outdoor air samples were collected to evaluate concentrations of arsenic in fugitive dust.

A variety of trace (parts per billion by volume) VOCs were detected in indoor air samples collected from the Palisades Child Care Center; all but three substances were estimated below or slightly above the method detection limit. Toluene was detected at levels similar to that of normal ambient air where exhaust emissions from cars are near the sample location (Lockheed Martin/USEPA/ERTC 2001). D-limonene is a common constituent of household cleaning products while n-nonanal is a constituent of petroleum products. No PAHs were detected in the indoor air samples. No arsenic was detected in four outdoor ambient air samples collected at the property's fenceline; 5.3 ppm of arsenic was detected in one soil sample collected from the outdoor play area. The background level of arsenic in soil is considered to be 5 ppm (ATSDR 2000). The NJDEP residential Soil Clean-up Criteria for arsenic is 20 ppm; this concentration is not health based but rather is the average number that has been found naturally occurring in New Jersey (R. Hayton, NJDEP, personal communication, 2002).

Combined QRC Site and Neighboring Properties

Groundwater

Groundwater monitoring was conducted during November 1998 and July 1999 utilizing 27 monitoring wells**.** Table 9 provides the minimum and maximum concentration of contaminants detected as compared with established New Jersey Groundwater Quality Criteria. New Jersey drinking water Maximum Contaminant Levels were also provided for informational purposes. Groundwater Quality Criteria were exceeded for arsenic, lead, and total VOCs. The maximum concentration of total PAHs detected in groundwater were 30,900 parts per billion (ppb). There is currently no established groundwater criteria for total PAHs.

Pathways Analysis

An exposure pathway is the process by which an individual is exposed to contaminants from a source of contamination and consists of the following five elements:

(1) source of contamination;
(2) environmental media (e.g., air, groundwater, surface water, soil, sediment, biota);
(3) point of exposure (i.e., location of potential or actual human contact with a contaminated medium);
(4) route of exposure (e.g., inhalation, dermal contact/absorption, ingestion); and
(5) receptor population.

Potential exposure pathways for which the QRC site constitutes the source of contamination are depicted in the following chart:

Potential Human Exposure Pathways Associated with the Quanta Resources, Inc. Site				
Pathway Name	Environmental Medium	Point of Exposure	Route of Exposure	Exposed Population
surface soil and dust	surface soil and dust	Quanta Resources, Inc. site, nearby buildings and yards	skin contact, inhalation, ingestion	workers, trespassers, nearby residents (includes children and mature populations), passersby
ambient air	air	nearby buildings and yards	inhalation, skin contact	workers, nearby residents (includes children and mature populations), consumers who frequent the nearby commercial businesses
sediment	sediment	Hudson River	skin contact, ingestion	workers, residents, users of a conceivable public access river walk

The potential exposure pathways described above include: 1) incidental ingestion of contaminants in soil and sediment; 2) inhalation of contaminants in air and dust; and 3) dermal contact with contaminants in surface water, soil, dust, and sediment.

A completed exposure pathway exists when the five elements of a pathway link the contaminant source to a receptor population. ATSDR Health Comparison Values (HCV), which include Cancer Risk Evaluation Guides (CREGs), are used to determine which contaminants detected may be at levels of potential health concern. The concentrations of contaminants found in various environmental media that a person might come in contact with on a daily basis are compared to a HCV. In general, if a HCV is exceeded, the exposure is of potential concern and the contaminant should be further evaluated. HVCs, however, should not be used as predictors of adverse health effects or for setting clean-up levels. On the other hand, exposures below HCVs may be of concern due to the interactive effect of multiple-media exposures. Hypersensitive (i.e., allergic) individuals must be taken into consideration as well.

For each of the potential pathways delineated in the above table (i.e., surface soil and dust, ambient air, sediment), there is presently no *route of exposure* element to complete the human exposure pathway at the QRC site. This is due to the fact that the site is currently closed to entry, portions of the site are covered with asphalt, and no work activity is occurring at the site at the present time. During both site visits, however, there were indications of trespassers at the QRC site (e.g.,

footprints, evidence of individuals walking their dogs). The potential for exposure to these individuals on a routine basis is unlikely and does not justify a completed exposure pathway designation.

Based upon available information and observation at the QRC site, potential human exposure routes may include dermal contact with and/or incidental ingestion of contaminated on-site soils and river sediments. Although site-specific air data were not available for review for this Public Health Assessment, general concerns regarding odors at the site may suggest a localized potential air pathway, especially during any future remediation and/or construction activities which disturb on-site soils and river sediments. Additionally, these activities may produce fugitive dust exposures for the nearby community. Activities associated with the Hudson River (i.e., fishing, boating, ingestion of biota) may be associated with an exposure pathway linked to the QRC site, however, there are other well known sources of PCB and other contaminants in the Hudson River (K. Johnson 2001). There are no data currently available that establish a completed exposure pathway to nearby human populations.

Results of air and soil sample data from the Palisades Child Care Center do not indicate a health concern. However, they are limited and may not adequately characterize possible exposures, especially if any future work activities which disturb QRC site soils and river sediments commence.

Public Health Implications

There were no identified completed exposure pathways associated with the QRC site to be evaluated since, at the present time, no remediation and/or construction activities are being conducted at the site.

Since residents and nearby workers have expressed concern about area site-related hazards, general health information for the contaminants detected at the QRC site and neighboring properties is provided in Appendix A. This information has been compiled by the ATSDR and is available in full from the sources identified in the Appendix.

Child Health Considerations/Potentially Sensitive Populations

ATSDR's Child Health Initiative recognizes that the unique vulnerabilities of infants and children demand special emphasis in communities faced with contamination in their environment. Children are at greater risk than adults from certain kinds of exposures to hazardous substances because they eat and breathe more than adults. They also play outdoors and often bring food into contaminated areas. They are shorter than adults, which means they breathe dust, soil, and heavy vapors closer to the ground. Children are also smaller, resulting in higher doses of chemical exposure per body weight. The developing body systems of children can sustain permanent damage if toxic exposures occur during critical growth stages. Most important, children depend completely on adults for risk identification and management decisions, housing decisions, and access to medical care.

Children, such as those attending the Palisades Child Center, may be at risk of potential

exposures to contaminants detected at the QRC site. Mature individuals residing in the vicinity of the site (e.g., Waterford Towers and the Sunrise Assisted Living facility) may also be considered sensitive populations at risk of potential exposures.

Conclusions

Hazard Category for the QRC Site

The Public Health Hazard Category recommended for the QRC site is ***"Indeterminate Public Health Hazard."***

1. Current conditions indicate that there are no apparent completed human exposure pathways at the QRC site. Dermal exposures to workers, trespassers, nearby residents, and passersby from contaminated surface soil, sediment, and fugitive dust is a potential human exposure pathway if groundbreaking activities commence at the QRC site.

2. General concerns regarding odors at the site may suggest a localized potential pathway, especially during heavy construction and/or remediation activities which disturb on-site soils and river sediments. Digging or working in the soil may cause inhalation exposures due to volatilization. Area odors may indicate a possible exposure pathway although there were no measurements to support this observation at the time of report preparation.

3. Visible contamination and tidal fluctuations of the Hudson River adjacent to the QRC site make wading and/or swimming unattractive and a potential health hazard. However, there are reports that individuals waded in the river sediment to observe holiday fireworks, indicating that this exposure pathway is possible and has occurred in the recent past.

4. Redevelopment of contiguous properties to the QRC site is continuing at this time. Neighboring properties had contaminant levels comparable to and sometimes higher than those detected on the QRC site.

Recommendations

1. In the event of future remediation and/or construction activities at the QRC site, appropriate environmental monitoring should be implemented.

2. Environmental regulatory agencies should ensure that these neighboring properties are investigated and, if necessary, remediated to protect the health of workers, residents, and the general public. Serious consideration should be given to expanding the current boundary of potential concern and public health risk.

3. Results of limited environmental sampling conducted at the Palisades Child Care Center do not indicate exposures at levels of public health concern. However, additional samples, including ambient air, interior dust wipes, and outdoor soil samples for lead, should be obtained during hours of normal building occupancy in order to quantify maximum potential contaminant exposures. Further environmental monitoring of other off-site businesses and residences should be considered to ensure there are no completed human exposure pathways from on-site sources of contamination.

4. Signs should be posted to better inform the community that the QRC site is a designated Superfund site.

5. Individuals should adhere to information provided in "A Guide to Health Advisories for Eating Fish and Crabs Caught in New Jersey Waters" (NJDEP and NJDHSS 1997) for the Hudson River. Widespread water and sediment quality problems affect the Hudson River although these problems cannot be solely attributed to any one particular source.

Public Health Action Plan

The Public Health Action Plan (PHAP) for the QRC site contains a description of the actions to be taken by the NJDHSS and/or ATSDR at or in the vicinity of the site subsequent to the completion of this Public Health Assessment. The purpose of the PHAP is to ensure that this health assessment not only identifies public health hazards, but provides a plan of action designed to mitigate and prevent adverse human health effects resulting from exposure to hazardous substances in the environment. Included is a commitment on the part of the NJDHSS and ATSDR to follow up on this plan to ensure that it is implemented. The public health actions to be implemented by NJDHSS and ATSDR are as follows:

Public Health Actions Taken

1. Available environmental data and other relevant information for the QRC site have been reviewed and evaluated to determine human exposure pathways and public health issues.

2. The NJDHSS has prepared a site specific public health Citizen's Guide for the QRC site which will be made available to the Bergen County Department of Health Services and other interested parties.

3. On July 26, 2001, NJDHSS staff met with two public health nurses for Edgewater Borough and provided a variety of health information on contaminants detected at the QRC site and neighboring properties.

4. On August 16, 2001, staff of the NJDHSS attended a USEPA meeting with residents of The Promenade and other interested parties in an effort to learn of community health concerns. NJDHSS staff answered health-related questions regarding potential exposures to contaminants. The NJDHSS is actively working in conjunction with the USEPA and NJDEP to address concerns specifically related to public health issues.

Public Health Actions Planned

1. As warranted, the NJDHSS will work to complement community outreach activities performed by the USEPA and NJDEP.

2. Commensurate with future remediation and/or construction activities at the QRC site, public health implications and the potential for completed human exposure pathways will be re-evaluated. If additional data become available to indicate that there are completed human exposure pathways attributable to the QRC site, the current designated Hazard Category for the site will be reconsidered.

References

ATSDR. Toxicological Profile for Arsenic. Atlanta, GA: US Department of Health and Human Services; 2000 August.

ATSDR. Toxicological Profile for Chromium. Atlanta, GA: US Department of Health and Human Services; 2000 September.

ATSDR. Toxicological Profile for Lead. Atlanta, GA: US Department of Health and Human Services; 1999 July.

ATSDR. Toxicological Profile for Polychlorinated Biphenyls. Atlanta, GA: US Department of Health and Human Services; 2000 November.

ATSDR. Toxicological Profile for Polycyclic Aromatic Hydrocarbons (PAHs). Atlanta, GA: US Department of Health and Human Services; 1995 August.

ATSDR. ToxFAQs. Available from: URL: www.atsdr.cdc.gov/toxfaq.html; downloaded 2001 October.

Dwyer, Jim. "Above, $700,000 Riverfront Condos; Below, a Toxic Question Mark." The New York Times; 2001 July 26.

Environmental Waste Management Associates. Remedial Investigation Report. Volume I of II. Property Know as the Former Celotex Industrial Park, River Road, Edgewater, Bergen County, New Jersey. Parsippany, New Jersey; 2000 September.

GeoSyntec Consultants. Removal Site Investigation Report (Revision 0), Quanta Resources Site, Edgewater, New Jersey. Project Number: GL0520-105. Atlanta, GA; 1999 October.

Johnson, Kirk. "EPA to Proceed with Dredging Plan for Hudson PCBs." New York Times. August 1, 2001.

Lockheed Martin Technology Services Group, Environmental Services REAC/USEPA/ERTC. Quanta Resources Site, Edgewater, New Jersey, Work Assignment #0-216 - Trip Report. Edison, NJ; 2001 June 21.

Melick-Tully and Associates, P.C. Report: Soils and Foundation Investigation. Proposed Glenwood Mall Promenade, Edgewater, New Jersey, G. Heller Enterprises, Inc. South Bound Brook, NJ; 2000 October 19.

Mignone, Thomas. ATSDR Regional Information System 2.6 Record of Activity. Quanta

Resources. Action Date: 10/13/1998.

NJDEP. Letter to Kevin Ford, Esq., attached for signature of clients, Administrative Consent Order - Quanta Resources Corporation, October 25, 1983.

NJDEP. Quanta Resources Corporation NPL Proposal Memorandum to Governor Christine Todd Whitman. Trenton, NJ; September 5, 2000.

NJDEP and NJDHSS. A Guide to Health Advisories for Eating Fish and Crabs Caught in New Jersey Waters. June 1997 Edition.

NJDHSS. Lead Advisory Bulletin. Renovation and Remodeling in Schools: You May Disturb Lead-Based Paint. Trenton, New Jersey; 1999 Fall.

Roy F. Weston, Inc. Hazard Ranking System Documentation Package, Quanta Resources, Edgewater, Bergen County, New Jersey. CERCLIS ID No. : NJD000606442. Volume 1 of 1. USEPA Contract No. 68-W7-0026. Work Assignment No.: 053-HRHR-02ZZ. Work Order No.: 20064-053-100-2022. Prepared for USEPA Region II. Edison, NJ; December 2000.

Toxicology, Occupational Medicine and Environmental Series (TOMES) ChemKnowledge plus LOLI. MICROMEDEX, Englewood, Colorado (Edition expires October 31, 2000).

USEPA, National Enforcement Investigations Center, Denver, Colorado. Summary of Waste Oil Recycling Facility Investigations, Regions II and V; 1983 October.

USEPA, Emergency Response Branch. Planned Removal Request for the Quanta Resources Corporation, Edgewater, New Jersey - ACTION MEMORANDUM. 1984 May.

USEPA, 1985a. Proposed CERCLA Consent Order for Quanta Edgewater Facility. 1985 April 3.

USEPA, 1985b. Order on Consent, Index No. II-CERCLA-50108. 1985 September 26.

USEPA, undated. Planned Removal Request for the Quanta Resources Corporation, Edgewater, New Jersey - Action Memorandum.

United Water New Jersey. 1999 Consumer Confidence Report. Harrington Park, New Jersey.

Acknowledgment

The authors of this report gratefully acknowledge Mr. Robert Hayton, Bureau of Federal Case Management, NJDEP for his time, sharing his knowledge of the site, and access to files for review and photocopying.

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Figure 1 - General site location.

Demographic Statistics Within One Mile of Site*	
Total Population	32906
White	29181
Black	615
American Indian, Eskimo, Aleut	49
Asian or Pacific Islander	1268
Other Race	1788
Hispanic Origin	6367
Children Aged 6 and Younger	2479
Adults Aged 65 and Older	5387
Females Aged 16 - 44	7842
Total Housing Units	15972

Demographics Statistics Source: 1990 US Census
*Calculated using an area-proration spatial analysis technique

Figure 2 - Demographic information for a one mile radius of the QRC site.

Figure 3 - On-site detail. Adapted from USEPA; *Aerial Photographic Analysis*, March 1999.

Table 1

On-Site Sample Results: Quanta Resources Corporation Site
Soil Data From October 1999 Removal Site Investigation Report (GeoSyntec Consultants, Atlanta, GA)

***Surface* Soil Samples (0-0.5 foot depth) Collected between March 1992 - June 1999**						
Substance	No. Samples Analyzed	Minimum Concentration Detected (ppm)	Maximum Concentration Detected (ppm)	ATSDR Health Comparison Value (ppm)	NJDEP Residential Cleanup Criteria (ppm)	NJDEP Non-Residential Cleanup Criteria (ppm)
Arsenic	12	0.0072	17	0.5 (CREG[1])	20	20
Total Chromium	12	0.006	4.8			
Lead	12	0.069	4,540		400	600
Total BTEX[2]	0			10 (CREG)		
Total PAHs	2	332	14,700	0.1 (CREG[3])	0.66	0.66
Total PCBs	11	ND	74	0.4 (CREG)	0.49	2
Total SVOCs	2	349	14,700			
Total VOCs	6	ND	ND	10 (CREG[4])	3	13

[1]CREG = ATSDR Cancer Risk Evaluation Guide for 1E-06 excess cancer risk
[2]BTEX = benzene, toluene, ethylbenzene, and xylene; benzene used as worst case indicator compound for CREG value
[3]benzo(a)pyrene used as worst case indicator compound
[4]benzene used as worst case indicator compound
SVOCs = semi-volatile organic compounds; ND = none detected

Table 2

On-Site Sample Results: Quanta Resources Corporation Site
Soil Data From October 1999 Removal Site Investigation Report (GeoSyntec Consultants, Atlanta, GA)

***Sub-Surface* Soil Samples (>0.5 foot depth) Collected between March 1992 - June 1999**						
Substance	No. Samples Analyzed	Minimum Concentration Detected (ppm)	Maximum Concentration Detected (ppm)	ATSDR Health Comparison Value (ppm)	NJDEP Residential Cleanup Criteria (ppm)	NJDEP Non-Residential Cleanup Criteria (ppm)
Arsenic	20	1.8	67.2	0.5 (CREG[1])	20	20
Total Chromium	19	5.4	35			
Lead	19	3.4	553		400	600
Total BTEX[2]	5	ND	187	10 (CREG)		
Total PAHs	20	0.69	31,600	0.1 (CREG[3])	0.66	0.66
Total PCBs	2	ND	0.14	0.4 (CREG)	0.49	2
Total SVOCs	24	0.69	31,600			
Total VOCs	5	ND	187	10 (CREG[4])	3	13

[1]CREG = ATSDR Cancer Risk Evaluation Guide for 1E-06 excess cancer risk
[2]BTEX = benzene, toluene, ethylbenzene, and xylene; benzene used as worst case indicator compound for CREG value
[3]benzo(a)pyrene used as worst case indicator compound
[4]benzene used as worst case indicator compound
SVOCs = semi-volatile organic compounds; ND = none detected

Table 3

On-Site Sample Results: Quanta Resources Corporation Site

Sediment Data From October 1999 Removal Site Investigation Report (GeoSyntec Consultants, Atlanta, GA)

***Surface* Sediment Samples (0-1 foot depth) Collected between June 1995 - June 1999**					
Substance	Total No. Samples Analyzed	Minimum Concentration detected (ppm)	Maximum Concentration Detected (ppm)	NJDEP Guidance for Sediment Quality Evaluations (Freshwater) November 1998 (not human health based) (ppm)	NJDEP Guidance for Sediment Quality Evaluations (Saltwater) November 1998 (not human health based) (ppm)
Arsenic	7	14.6	19.1	6	8.2
Total Chromium	7	74.9	83.7	26	81
Lead	7	104	130	31	47
Total BTEX[1]	0				
Total PAHs[2]	7	42.9	728	4	4
Total PCBs	7	0.42	0.91	0.07	0.023
Total SVOCs[3]	7	42.9	728	4	4
Total VOCs[4]	0				

[1]BTEX = benzene, toluene, ethylbenzene, and xylene; benzene used as worst case indicator compound

[2]benzo(a)pyrene used as worst case indicator compound

[3] SVOCs assumed same as Total PAHs based on quantitative laboratory results

[4]VOCs assumed same as Total BTEX based on quantitative laboratory results

SVOCs = semi-volatile organic compounds; ND = none detected;

Table 4

On-Site Sample Results: Quanta Resources Corporation Site
Sediment Data From October 1999 Removal Site Investigation Report (GeoSyntec Consultants, Atlanta, GA)

***Sub-surface* Sediment Samples (> 1 foot depth) Collected between June 1995 - June 1999**					
Substance	Total No. Samples Analyzed	Minimum Concentration detected (ppm)	Maximum Concentration Detected (ppm)	NJDEP Guidance for Sediment Quality Evaluations (Freshwater) November 1998 (not human health based) (ppm)	NJDEP Guidance for Sediment Quality Evaluations (Saltwater) November 1998 (not human health based) (ppm)
Arsenic	11	17.4	100	6	8.2
Total Chromium	11	147	270	26	81
Lead	11	202	362	31	47
Total BTEX[1]	1	0.4	0.4		
Total PAHs[2]	13	51.5	12,600	4	4
Total PCBs	11	0.18	2.5	0.07	0.023
Total SVOCs[3]	13	65.1	12,600	4	4
Total VOCs[4]	1	0.82	0.82		

[1]BTEX = benzene, toluene, ethylbenzene, and xylene; benzene used as worst case indicator compound
[2]benzo(a)pyrene used as worst case indicator compound
[3]SVOCs assumed same as Total PAHs based on quantitative laboratory results
[4]VOCs assumed same as Total BTEX based on quantitative laboratory results

Table 5

Off-Site Sample Results: Neighboring Properties to Quanta Resources Corporation Site
Soil Data From October 1999 Removal Site Investigation Report (GeoSyntec Consultants, Atlanta, GA)

***Surface* Soil Samples (0-0.5 foot depth) Collected between March 1992 - June 1999**						
Substance	No. Samples Analyzed	Minimum Concentration Detected (ppm)	Maximum Concentration Detected (ppm)	ATSDR Health Comparison Value (ppm)	NJDEP Residential Cleanup Criteria (ppm)	NJDEP Non-Residential Cleanup Criteria (ppm)
Arsenic	34	1.3	27.5	0.5 (CREG[1])	20	20
Total Chromium	31	17.2	80.4			
Lead	32	18.5	408		400	600
Total BTEX[2]	0			10 (CREG)	3	13
Total PAHs	35	ND	1,150	0.1 (CREG[3])	0.66	0.66
Total PCBs	7	ND	14.6	0.4 (CREG)	0.49	2
Total SVOCs	35	ND	1,190	0.1 (CREG[4])	0.66	0.66
Total VOCs	0			10 (CREG[5])	3	13

[1]CREG = ATSDR Cancer Risk Evaluation Guide for 1E-06 excess cancer risk

[2]BTEX = benzene, toluene, ethylbenzene, and xylene; benzene used as worst case indicator compound

[3]benzo(a)pyrene used as worst case indicator compound

[4]assumed same as Total PAHs based on quantitative laboratory results

[5]assumed same as Total BTEX based on quantitative laboratory results

Table 6

Off-Site Sample Results: Neighboring Properties to Quanta Resources Corporation Site
Soil Data From October 1999 Removal Site Investigation Report (GeoSyntec Consultants, Atlanta, GA)

***Sub-Surface* Soil Samples (>-0.5 foot depth) Collected between March 1992 - June 1999**						
Substance	No. Samples Analyzed	Minimum Concentration Detected (ppm)	Maximum Concentration Detected (ppm)	ATSDR Health Comparison Value (ppm)	NJDEP Residential Cleanup Criteria (ppm)	NJDEP Non-Residential Cleanup Criteria (ppm)
Arsenic	154	ND	3,370	0.5 (CREG[1])	20	20
Total Chromium	108	2.7	676			
Lead	155	ND	10,800		400	600
Total BTEX[2]	30	ND	392	10 (CREG)	3	13
Total PAHs[3]	243	ND	23,400	0.1 (CREG)	0.66	0.66
Total PCBs	75	ND	6,810	0.4 (CREG)	0.49	2
Total SVOCs[4]	244	ND	24,200	0.1 (CREG)	0.66	0.66
Total VOCs[5]	30	ND	392	10 (CREG)	3	13

[1]CREG = ATSDR Cancer Risk Evaluation Guide for 1E-06 excess cancer risk

[2]BTEX = benzene, toluene, ethylbenzene, and xylene; benzene used as worst case indicator compound

[3]benzo(a)pyrene used as worst case indicator compound

[4]assumed same as Total PAHs based on quantitative laboratory results

[5]assumed same as Total BTEX based on quantitative laboratory results

Table 7

Off-Site Sample Results: Neighboring Properties to Quanta Resources Corporation Site
Sediment Data From October 1999 Removal Site Investigation Report (GeoSyntec Consultants, Atlanta, GA)

***Surface* Sediment Samples (0-1 foot depth) Collected between June 1995 - June 1999**					
Substance	Total No. Samples Analyzed	Minimum Concentration detected (ppm)	Maximum Concentration Detected (ppm)	NJDEP Guidance for Sediment Quality Evaluations (Freshwater) November 1998 (not human health based) (ppm)	NJDEP Guidance for Sediment Quality Evaluations (Saltwater) November 1998 (not human health based) (ppm)
Arsenic	28	6.7	2,150	6	8.2
Total Chromium	28	43.2	160	26	81
Lead	28	62.9	1,540	31	47
Total BTEX[1]	0				
Total PAHs[2]	28	4.7	1,140	4	4
Total PCBs	28	0.34	3.5	0.07	0.023
Total SVOCs[3]	28	4.7	1,140	4	4
Total VOCs[4]	0				

[1]BTEX = benzene, toluene, ethylbenzene, and xylene; benzene used as worst case indicator compound
[2]benzo(a)pyrene used as worst case indicator compound
[3]SVOCs assumed same as Total PAHs based on quantitative laboratory results
[4]VOCs assumed same as Total BTEX based on quantitative laboratory results

Table 8

Off-Site Sample Results: Neighboring Properties to Quanta Resources Corporation Site
Sediment Data From October 1999 Removal Site Investigation Report (GeoSyntec Consultants, Atlanta, GA)

***Sub-Surface* Sediment Samples (>1 foot depth) Collected between June 1995 - June 1999**					
Substance	Total No. Samples Analyzed	Minimum Concentration detected (ppm)	Maximum Concentration Detected (ppm)	NJDEP Guidance for Sediment Quality Evaluations (Freshwater) November 1998 (not human health based) (ppm)	NJDEP Guidance for Sediment Quality Evaluations (Saltwater) November 1998 (not human health based) (ppm)
Arsenic	20	15.7	1,860	6	8.2
Total Chromium	20	61.1	270	26	81
Lead	20	128	780	31	47
Total BTEX[1]	1	28.2	28.2		
Total PAHs[2]	22	7	21,500	4	4
Total PCBs	20	ND	6.5	0.07	0.023
Total SVOCs[3]	22	7	21,500	4	4
Total VOCs[4]	1	28.2	28.2		

[1]BTEX = benzene, toluene, ethylbenzene, and xylene; benzene used as worst case indicator compound
[2]benzo(a)pyrene used as worst case indicator compound
[3]SVOCs assumed same as Total PAHs based on quantitative laboratory results
[4]VOCs assumed same as Total BTEX based on quantitative laboratory results

Table 9

Quanta Resources Corporation Site and Neighboring Properties
Groundwater Data From October 1999 Removal Site Investigation Report (GeoSyntec Consultants, Atlanta, GA)

Groundwater Samples Collected in November 1998 and July 1999						
Substance	No. Samples Analyzed	Minimum Concentration Detected (ppb)	Maximum Concentration Detected (ppb)	Groundwater Quality Criteria NJAC 7:9-6 (ppb)	NJ Drinking Water Standard: Maximum Contaminant Level (ppb)	ATSDR Drinking Water Comparison Value (ppb)
Arsenic	27	13	20,900	0.02	50	0.02 (CREG[1])
Total Chromium	27	2.5	34	100	100	
Lead	27	2.8	59	5	15 (Action Level)	
Total BTEX[2]	27	2	23,100	0.2	1	0.6 (CREG)
Total PAHs[3]	27	19	30,900	not available	0.2	0.005 (CREG)
Total PCBs	4	ND	ND	0.02	0.5	0.02 (CREG)
Total SVOCs[4]	27	2.3	114,000	not available	0.2	0.005 (CREG)
Total VOCs[5]	27	2.3	23,900	0.2	1	0.6 (CREG)

[1]CREG = ATSDR Cancer Risk Evaluation Guide for 1E-06 excess cancer risk
[2]BTEX = benzene, toluene, ethylbenzene, and xylene; benzene used as worst case indicator compound
[3]benzo(a)pyrene used as worst case indicator compound
[4]SVOCs assumed same as Total PAHs based on quantitative laboratory results
[5]VOCs assumed same as Total BTEX based on quantitative laboratory results

Appendix A

The ATSDR ToxFAQs, found at www.atsdr.cdc.gov/toxfaq.html, are summaries of hazardous substances developed by the ATSDR Division of Toxicology (ATSDR downloaded 2001). More detailed information on these hazardous substances is available from the ATSDR Toxicological Profiles and Public Health Statements. ToxFAQs provide answers to the most frequently asked questions (FAQs) about exposure to hazardous substances found around hazardous waste sites and the effects of exposure on human health. Excerpts for the contaminants detected at the QRC site and neighboring properties are described below.

ToxFAQs™™

Frequently Asked Questions About Contaminants Found at Hazardous Waste Sites

Arsenic

HIGHLIGHTS: Exposure to higher than average levels of arsenic occurs mostly in the workplace, near hazardous waste sites, or in areas with high natural levels. At high levels, inorganic arsenic can cause death. Exposure to lower levels for a long time can cause a discoloration of the skin and the appearance of small corns or warts. Arsenic has been found at 1,014 of the 1,598 National Priority List sites identified by the USEPA.

How can arsenic affect my health?

Breathing high levels of inorganic arsenic can give you a sore throat or irritated lungs. Ingesting high levels of inorganic arsenic can result in death. Lower levels of arsenic can cause nausea and vomiting, decreased production of red and white blood cells, abnormal heart rhythm, damage to blood vessels, and a sensation of "pins and needles" in hands and feet. Ingesting or breathing low levels of inorganic arsenic for a long time can cause a darkening of the skin and the appearance of small "corns" or "warts" on the palms, soles, and torso. Skin contact with inorganic arsenic may cause redness and swelling.

Organic arsenic compounds are less toxic than inorganic arsenic compounds. Exposure to high levels of some organic arsenic compounds may cause similar effects as inorganic arsenic.

How likely is arsenic to cause cancer?

Several studies have shown that inorganic arsenic can increase the risk of lung cancer, skin cancer, bladder cancer, liver cancer, kidney cancer, and prostate cancer. The World Health Organization, the Department of Health and Human Services, and the USEPA have determined that inorganic arsenic

is a human carcinogen.

Is there a medical test to show whether I've been exposed to arsenic?

There are tests to measure the level of arsenic in blood, urine, hair, or fingernails. The urine test is the most reliable test for arsenic exposure within the last few days. Tests on hair and fingernails can measure exposure to high levels or arsenic over the past 6-12 months. These tests can determine if you have been exposed to above-average levels of arsenic. They cannot predict how the arsenic levels in your body will affect your health.

Chromium

HIGHLIGHTS: Exposure to chromium occurs from ingesting contaminated food or drinking water or breathing contaminated workplace air. Chromium(III) occurs naturally in the environment and is an essential nutrient. Chromium(VI) and chromium(0) are generally produced by industrial processes. Chromium(VI) at high levels can damage the nose and can cause cancer. Chromium has been found at 1,036 of the 1,591 National Priority List sites identified by the USEPA.

How can chromium affect my health?

Skin contact with certain chromium(VI) compounds can cause skin ulcers. Some people are extremely sensitive to chromium(VI) or chromium(III). Allergic reactions consisting of severe redness and swelling of the skin have been noted.

How likely is chromium to cause cancer?

Several studies have shown that chromium(VI) compounds can increase the risk of lung cancer. Animal studies have also shown an increased risk of cancer.

Lead

HIGHLIGHTS: Exposure to lead can happen from breathing workplace air or dust, eating contaminated foods, or drinking contaminated water. Children can be exposed from eating lead-based paint chips or playing in contaminated soil. Lead can damage the nervous system, kidneys, and reproductive system. Lead has been found in at least 1,026 of 1,467 National Priorities List sites identified by the USEPA.

PAHs

HIGHLIGHTS: Exposure to polycyclic aromatic hydrocarbons usually occurs by breathing air contaminated by wild fires or coal tar, or by eating foods that have been grilled. PAHs have been found in at least 600 of the 1,430 National Priorities List sites identified by the USEPA.

What are polycyclic aromatic hydrocarbons (PAHs)?

Polycyclic aromatic hydrocarbons (PAHs) are a group of over 100 different chemicals that are formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances like tobacco or charbroiled meat. PAHs are usually found as a mixture containing two or more of these compounds, such as soot.

How likely are polycyclic aromatic hydrocarbons (PAHs) to cause cancer?

The Department of Health and Human Services has determined that some PAHs may reasonably be expected to be carcinogens. Some people who have breathed or touched mixtures of PAHs and other chemicals for long periods of time have developed cancer. Some PAHs have caused cancer in laboratory animals when they breathed air containing them (lung cancer), ingested them in food (stomach cancer), or had them applied to their skin (skin cancer).

PCBs

HIGHLIGHTS: Polychlorinated biphenyls (PCBs) are a mixture of individual chemicals which are no longer produced in the United States, but are still found in the environment. Health effects that have been associated with exposure to PCBs include acne-like skin conditions in adults and neurobehavioral and immunological changes in children. PCBs are known to cause cancer in animals. PCBs have been found in at least 500 of the 1,598 National Priorities List sites identified by the USEPA.

What are polychlorinated biphenyls (PCBs)?

Polychlorinated biphenyls are mixtures of up to 209 individual chlorinated compounds (known as congeners). There are no known natural sources of PCBs. PCBs have been used as coolants and lubricants in transformers, capacitors, and other electrical equipment because they don't burn easily and are good insulators. PCBs are either oily liquids or solids that are colorless to light yellow. Some PCBs can exist as a vapor in air. PCBs have no known smell or taste. Many commercial PCB mixtures are known in the United States by the trade name Aroclor. The manufacture of PCBs was stopped in the United States in 1977 because of evidence they build up in the environment and can

cause harmful health effects.

How likely are polychlorinated biphenyls (PCBs) to cause cancer?

Few studies of workers indicate that PCBs were associated with certain kinds of cancer in humans, such as cancer of the liver and biliary tract. Rats that ate food containing high levels of PCBs for two years developed liver cancer. The Department of Health and Human Services has concluded that PCBs may reasonably be anticipated to be carcinogens. The USEPA and the International Agency for Research on Cancer have determined that PCBs are probably carcinogenic to humans.

Glossary

ATSDR Plain Language Glossary of Environmental Health Terms

Absorption: How a chemical enters a person's blood after the chemical has been swallowed, has come into contact with the skin, or has been breathed in.

Acute Exposure: Contact with a chemical that happens once or only for a limited period of time. ATSDR defines acute exposures as those that might last up to 14 days.

Additive Effect: A response to a chemical mixture, or combination of substances, that might be expected if the known effects of individual chemicals, seen at specific doses, were added together.

Adverse Health Effect: A change in body function or the structures of cells that can lead to disease or health problems.

Antagonistic Effect: A response to a mixture of chemicals or combination of substances that is **less** than might be expected if the known effects of individual chemicals, seen at specific doses, were added together.

ATSDR: The **A**gency for **T**oxic **S**ubstances and **D**isease **R**egistry. ATSDR is a federal health agency in Atlanta, Georgia that deals with hazardous substance and waste site issues. ATSDR gives people information about harmful chemicals in their environment and tells people how to protect themselves from coming into contact with chemicals.

Background Level: An average or expected amount of a chemical in a specific environment. Or, amounts of chemicals that occur naturally in a specific environment.

Biota: Used in public health, things that humans would eat – including animals, fish and plants.

CAP: See **C**ommunity **A**ssistance **P**anel**.**

Cancer: A group of diseases which occur when cells in the body become abnormal and grow, or multiply, out of control

Carcinogen: Any substance shown to cause tumors or cancer in experimental studies.

CERCLA: See **C**omprehensive **E**nvironmental **R**esponse, **C**ompensation, and **L**iability **A**ct.

Chronic Exposure: A contact with a substance or chemical that happens over a long period of time. ATSDR considers exposures of more than one year to be *chronic*.

Completed Exposure Pathway: See **Exposure Pathway**.

Community Assistance Panel (CAP): A group of people from the community and health and environmental agencies who work together on issues and problems at hazardous waste sites.

Comparison Value (CVs): Concentrations or the amount of substances in air, water, food, and soil that are unlikely, upon exposure, to cause adverse health effects. Comparison values are used by health assessors to select which substances and environmental media (air, water, food and soil) need additional evaluation while health concerns or effects are investigated.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): **CERCLA** was put into place in 1980. It is also known as **Superfund**. This act concerns releases of hazardous substances into the environment, and the cleanup of these substances and hazardous waste sites. ATSDR was created by this act and is responsible for looking into the health issues related to hazardous waste sites.

Concern: A belief or worry that chemicals in the environment might cause harm to people.

Concentration: How much or the amount of a substance present in a certain amount of soil, water, air, or food.

Contaminant: See **Environmental Contaminant**.

Delayed Health Effect: A disease or injury that happens as a result of exposures that may have occurred far in the past.

Dermal Contact: A chemical getting onto your skin. (see **Route of Exposure**).

Dose: The amount of a substance to which a person may be exposed, usually on a daily basis. Dose is often explained as "amount of substance(s) per body weight per day".

Dose / Response: The relationship between the amount of exposure (dose) and the change in body function or health that result.

Duration: The amount of time (days, months, years) that a person is exposed to a chemical.

Environmental Contaminant: A substance (chemical) that gets into a system (person, animal, or the environment) in amounts higher than that found in **Background Level**, or what would be expected.

Environmental Media: Usually refers to the air, water, and soil in which chemical of interest are found. Sometimes refers to the plants and animals that are eaten by humans. **Environmental Media** is the second part of an **Exposure Pathway**.

U.S. Environmental Protection Agency (EPA): The federal agency that develops and enforces environmental laws to protect the environment and the public's health.

Epidemiology: The study of the different factors that determine how often, in how many people, and in which people will disease occur.

Exposure: Coming into contact with a chemical substance.(For the three ways people can come in contact with substances, see **Route of Exposure**.)

Exposure Assessment: The process of finding the ways people come in contact with chemicals, how often and how long they come in contact with chemicals, and the amounts of chemicals with which they come in contact.

Exposure Pathway: A description of the way that a chemical moves from its source (where it began) to where and how people can come into contact with (or get exposed to) the chemical.

ATSDR defines an exposure pathway as having 5 parts:

1. Source of Contamination,
2. Environmental Media and Transport Mechanism,
3. Point of Exposure,
4. Route of Exposure; and,
5. Receptor Population.

When all 5 parts of an exposure pathway are present, it is called a **Completed Exposure Pathway**. Each of these 5 terms is defined in this Glossary.

Frequency: How often a person is exposed to a chemical over time; for example, every day, once a week, twice a month.

Hazardous Waste: Substances that have been released or thrown away into the environment and, under certain conditions, could be harmful to people who come into contact with them.

Health Effect: ATSDR deals only with **Adverse Health Effects** (see definition in this Glossary).

Indeterminate Public Health Hazard: The category is used in Public Health Assessment documents for sites where important information is lacking (missing or has not yet been gathered) about site-related chemical exposures.

Ingestion: Swallowing something, as in eating or drinking. It is a way a chemical can enter your body (See **Route of Exposure**).

Inhalation: Breathing. It is a way a chemical can enter your body (See **Route of Exposure**).

LOAEL: **L**owest **O**bserved **A**dverse **E**ffect **L**evel. The lowest dose of a chemical in a study, or group of studies, that has caused harmful health effects in people or animals.

Malignancy: See **Cancer**.

MRL: **M**inimal **R**isk **L**evel. An estimate of daily human exposure – by a specified route and length of time -- to a dose of chemical that is likely to be without a measurable risk of adverse, noncancerous effects. An MRL should not be used as a predictor of adverse health effects.

NPL: The **N**ational **P**riorities **L**ist. (Which is part of **Superfund**.) A list kept by the U.S. Environmental Protection Agency (EPA) of the most serious, uncontrolled or abandoned hazardous waste sites in the country. An NPL site needs to be cleaned up or is being looked at to see if people can be exposed to chemicals from the site.

NOAEL: **N**o **O**bserved **A**dverse **E**ffect **L**evel. The highest dose of a chemical in a study, or group of studies, that did not cause harmful health effects in people or animals.

No Apparent Public Health Hazard: The category is used in ATSDR's Public Health Assessment documents for sites where exposure to site-related chemicals may have occurred in the past or is still occurring but the exposures are not at levels expected to cause adverse health effects.

No Public Health Hazard: The category is used in ATSDR's Public Health Assessment documents for sites where there is evidence of an absence of exposure to site-related chemicals.

PHA: **P**ublic **H**ealth **A**ssessment. A report or document that looks at chemicals at a hazardous waste site and tells if people could be harmed from coming into contact with those chemicals. The PHA also tells if possible further public health actions are needed.

Plume: A line or column of air or water containing chemicals moving from the source to areas further away. A plume can be a column or clouds of smoke from a chimney or contaminated underground water sources or contaminated surface water (such as lakes, ponds and streams).

Point of Exposure: The place where someone can come into contact with a contaminated environmental medium (air, water, food or soil). For examples:
the area of a playground that has contaminated dirt, a contaminated spring used for drinking water, the location where fruits or vegetables are grown in contaminated soil, or the backyard area where someone might breathe contaminated air.

Population: A group of people living in a certain area; or the number of people in a certain area.

PRP: **P**otentially **R**esponsible **P**arty. A company, government or person that is responsible for causing the pollution at a hazardous waste site. PRP's are expected to help pay for the clean up of a site.

Public Health Assessment(s): See **PHA**.

Public Health Hazard: The category is used in PHAs for sites that have certain physical features or evidence of chronic, site-related chemical exposure that could result in adverse health effects.

Public Health Hazard Criteria: PHA categories given to a site which tell whether people could be harmed by conditions present at the site. Each are defined in the Glossary. The categories are:

1. Urgent Public Health Hazard
2. Public Health Hazard
3. Indeterminate Public Health Hazard

4. No Apparent Public Health Hazard
5. No Public Health Hazard

Receptor Population: People who live or work in the path of one or more chemicals, and who could come into contact with them (See **Exposure Pathway**).

Reference Dose (RfD): An estimate, with safety factors (see **safety factor**) built in, of the daily, life-time exposure of human populations to a possible hazard that is not likely to cause harm to the person.

Route of Exposure: The way a chemical can get into a person's body. There are three exposure routes:
- breathing (also called inhalation),
- eating or drinking (also called ingestion), and
- or getting something on the skin (also called dermal contact).

Safety Factor: Also called **Uncertainty Factor**. When scientists don't have enough information to decide if an exposure will cause harm to people, they use "safety factors" and formulas in place of the information that is not known. These factors and formulas can help determine the amount of a chemical that is not likely to cause harm to people.

SARA: The **S**uperfund **A**mendments and **R**eauthorizatio n **A**ct in 1986 amended CERCLA and expanded the health-related responsibilities of ATSDR. CERCLA and SARA direct ATSDR to look into the health effects from chemical exposures at hazardous waste sites.

Sample Size: The number of people that are needed for a health study.

Sample: A small number of people chosen from a larger population (See **Population**).

Source (of Contamination): The place where a chemical comes from, such as a landfill, pond, creek, incinerator, tank, or drum. Contaminant source is the first part of an **Exposure Pathway**.

Special Populations: People who may be more sensitive to chemical exposures because of certain factors such as age, a disease they already have, occupation, sex, or certain behaviors (like cigarette smoking). Children, pregnant women, and older people are often considered special populations.

Statistics: A branch of the math process of collecting, looking at, and summarizing data or information.

Superfund Site: See **NPL**.

Survey: A way to collect information or data from a group of people (**population**). Surveys can be done by phone, mail, or in person. ATSDR cannot do surveys of more than nine people without approval from the U.S. Department of Health and Human Services.

Synergistic effect: A health effect from an exposure to more than one chemical, where one of the chemicals worsens the effect of another chemical. The combined effect of the chemicals acting together are greater than the effects of the chemicals acting by themselves.

Toxic: Harmful. Any substance or chemical can be toxic at a certain dose (amount). The dose is what determines the potential harm of a chemical and whether it would cause someone to get sick.

Toxicology: The study of the harmful effects of chemicals on humans or animals.

Tumor: Abnormal growth of tissue or cells that have formed a lump or mass.

Uncertainty Factor: See **Safety Factor**.

Urgent Public Health Hazard: This category is used in ATSDR's Public Health Assessment documents for sites that have certain physical features or evidence of short-term (less than 1 year), site-related chemical exposure that could result in adverse health effects and require quick intervention to stop people from being exposed.